



New Mexico Environment Department

DOE Oversight Bureau

2905 Rodeo Park Dr
E/Bldg 1
Santa Fe, NM 87505

Dave Englert and Ralph Ford-Schmid
(505) 476-6022 and 476-6023

Introduction

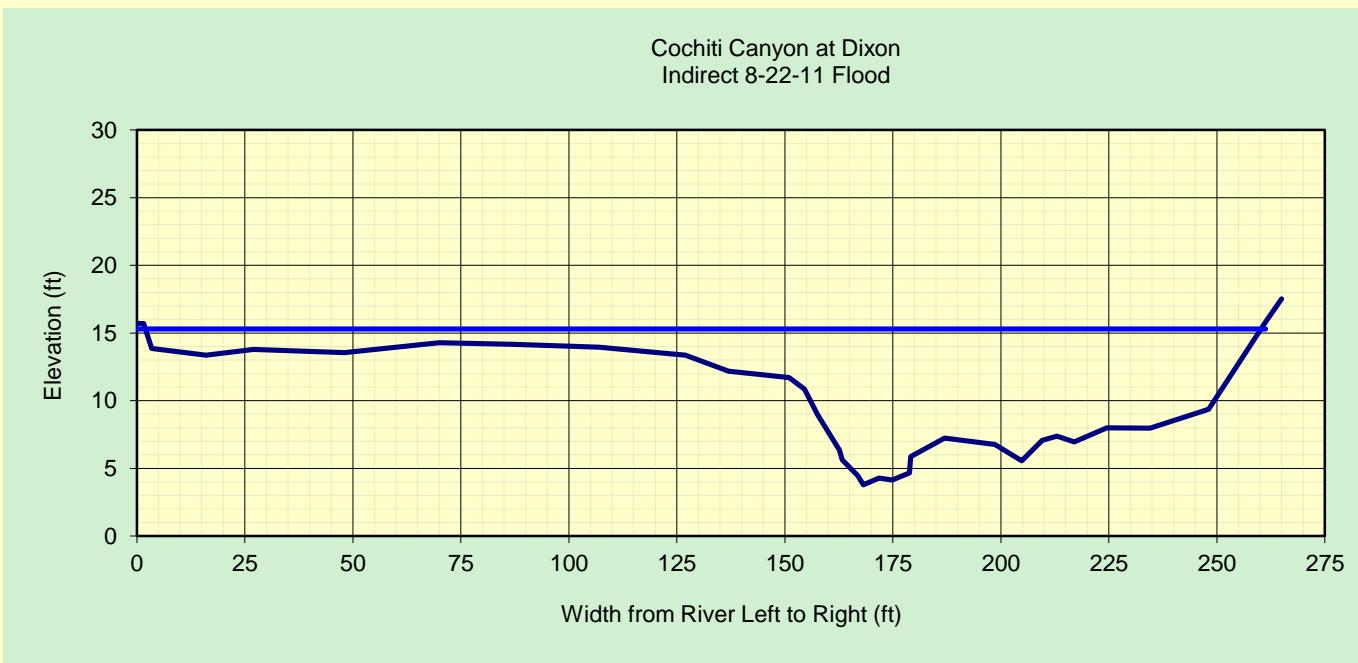
- **What Happened After the Los Conchas Fire?**
 - Increased Magnitude and Frequency of Flooding
 - Chemical Changes in Soils and Water from Ash
- **Is the Environment Safe?**
 - Physical Risks
 - No Acute Risk from chemical changes
 - Chronic Risks are being assessed by IFRAT (Integrated Fire Risk Assessment Team)
- **What's Next?**

What Are We Doing?

- **Collecting Storm water Samples and Monitoring Flow Conditions**
- **Samples are analyzed for varying suites of radionuclides, metals, nutrients, and organics in Water and Suspended Sediments**
- **Analytical results are compared to references**

In the Southern Jemez Mountain Area, Three of the Largest Floods to Date

Largest Flood in Cochiti Canyon at Dixon Orchard



Maximum Stage = 11.5 ft
Peak Flood = 19300 cfs

Largest Flood in Bland Canyon above Corrals



Maximum Stage = 10.8 ft
Peak Flood = 5260 cfs

largest Flood in Peralta Canyon below Dam

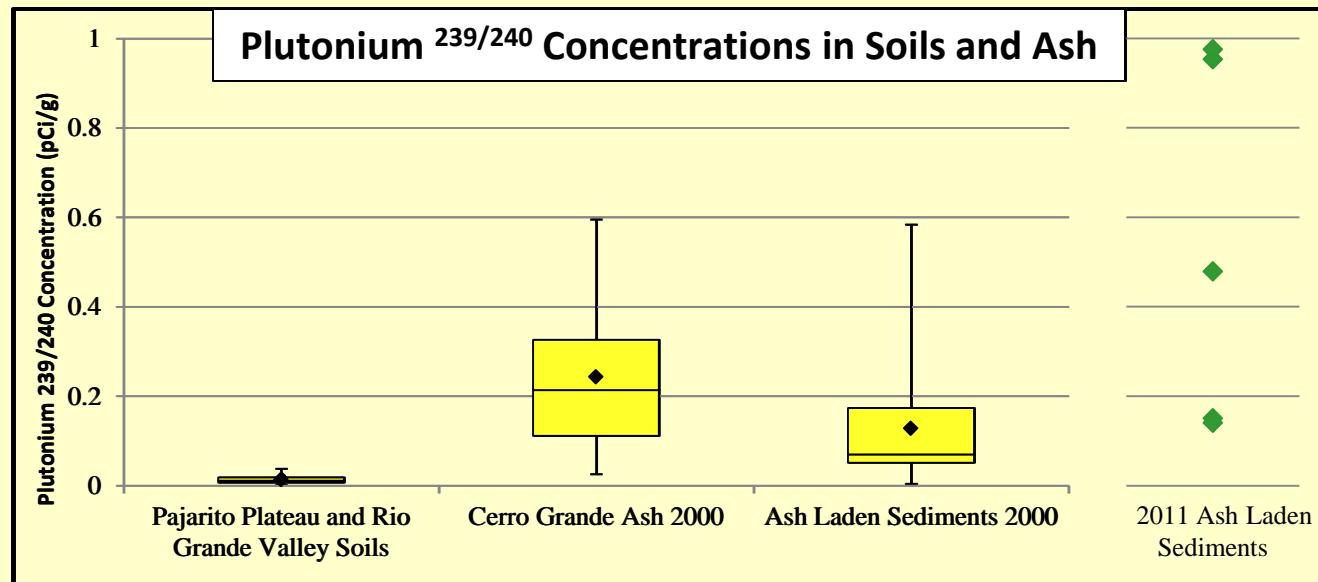


Maximum Stage = 6.3 ft
Peak Flood = 6300 cfs

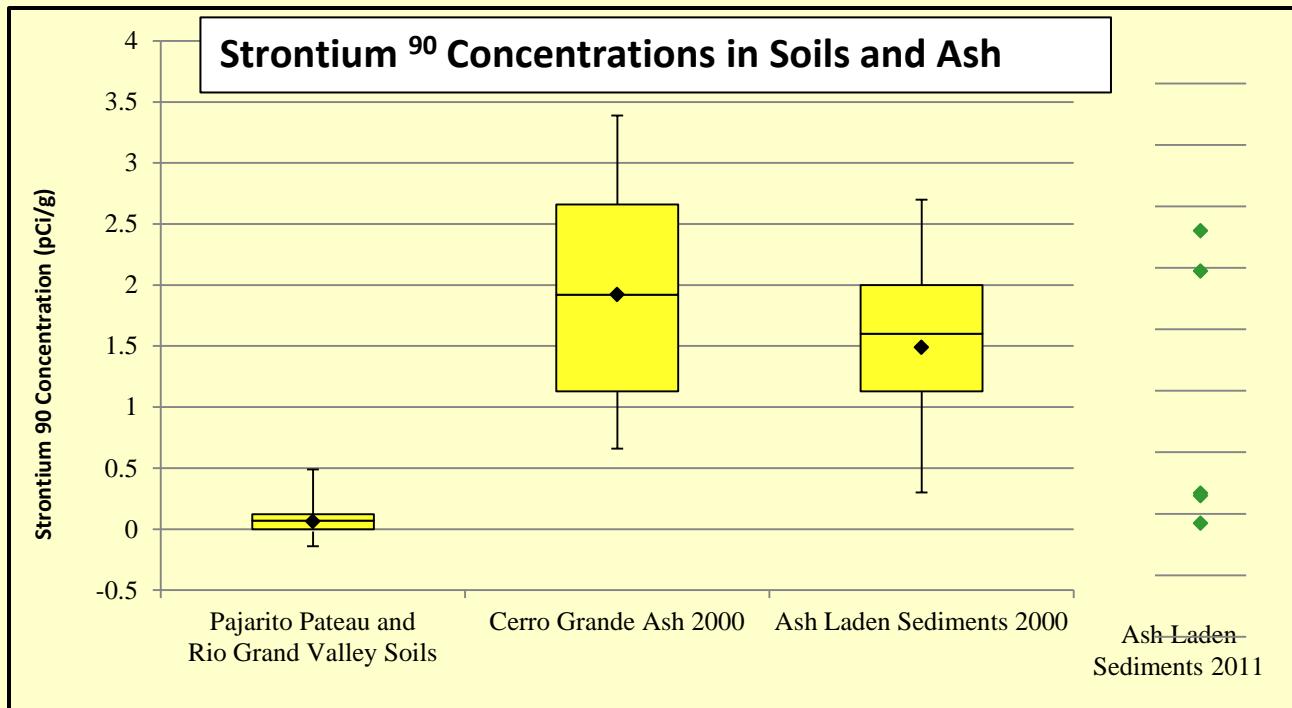
Chemical Data Evaluation

- **Samples were grouped into populations that demonstrate physical similarities**
 - Reference Background Soils
 - Cerro Grande Ash
 - Ash-laden Sediments from storm water
- **Samples are measured for 6 radionuclides, 23 metals, and other things**
- **We are comparing individual and population measurements to reference conditions like Ash from the Cerro Grande Fire and Background Soils**
- **The following charts are representative of these relationships**

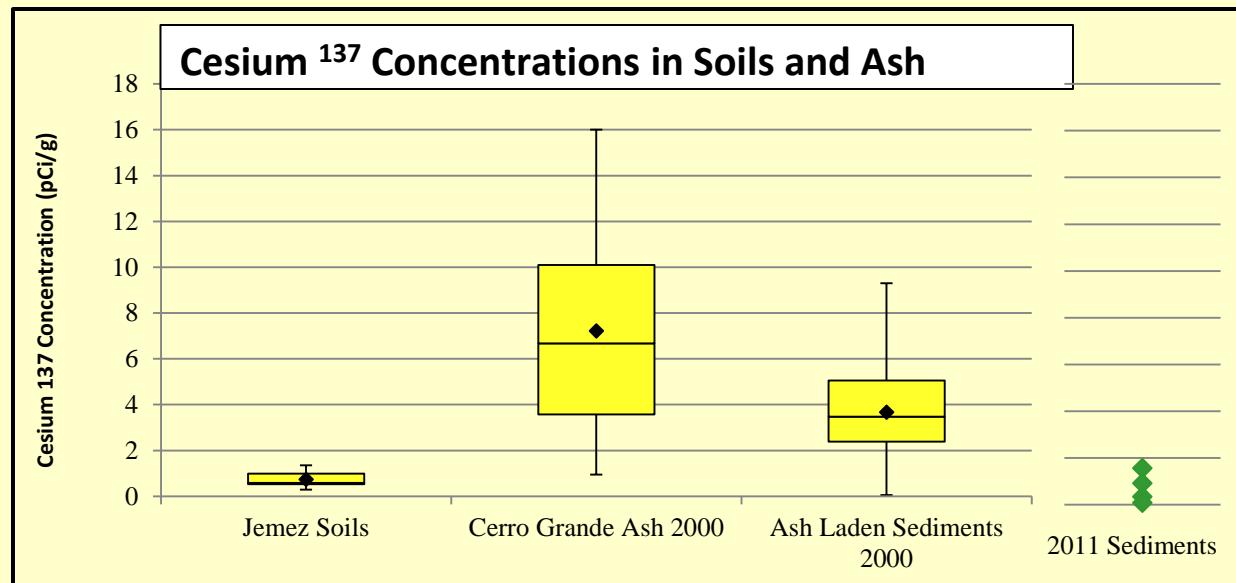
Plutonium Concentration in Background, Wildfire Ash, and Ash in Stormwater Transport



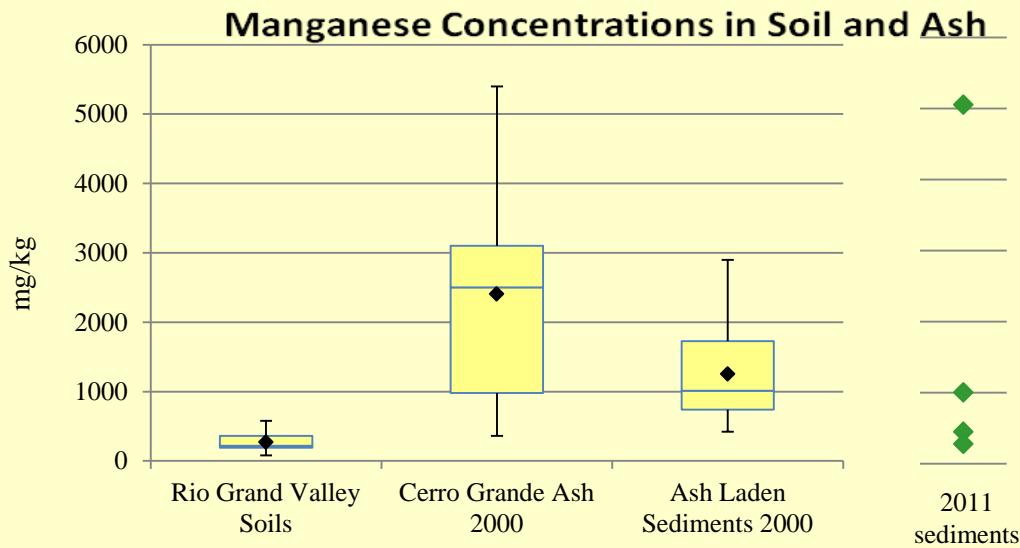
Strontium 90 Concentration in Background, Wildfire Ash, and Ash in Stormwater Transport



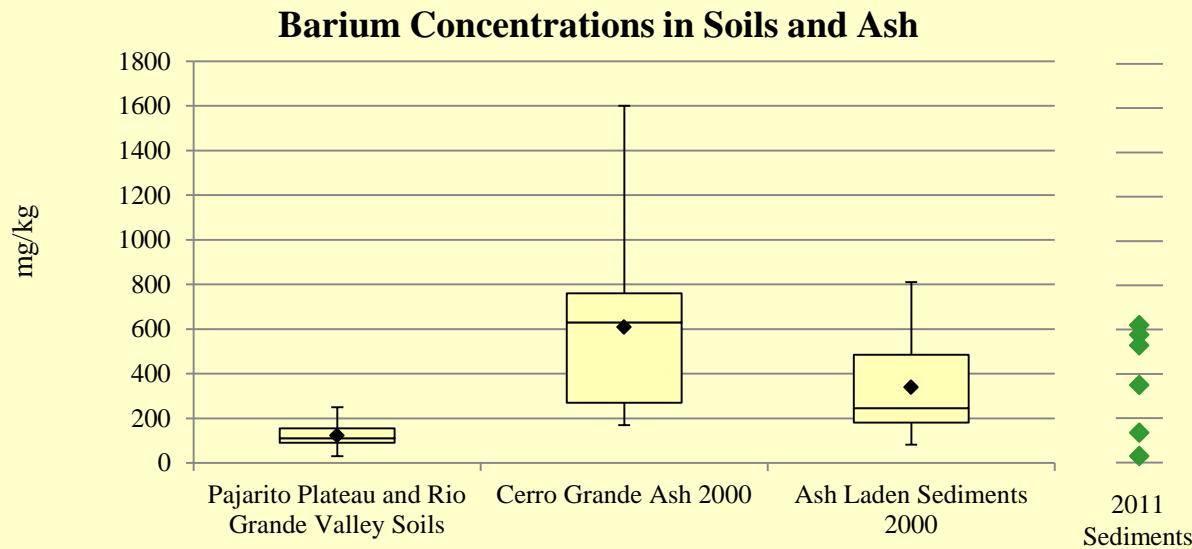
Cesium 137 Concentration in Background, Wildfire Ash, and Ash in Stormwater Transport



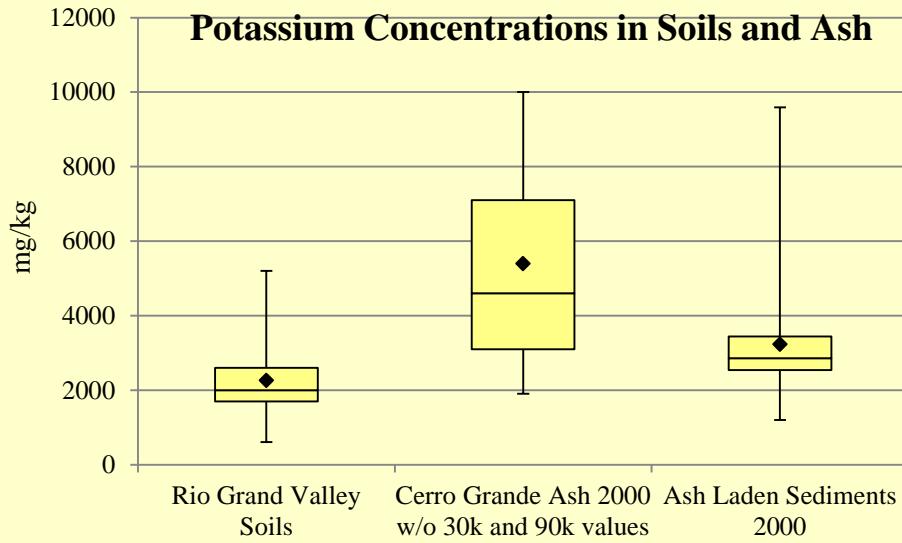
Manganese Concentration in Background, Wildfire Ash, and Ash in Stormwater Transport



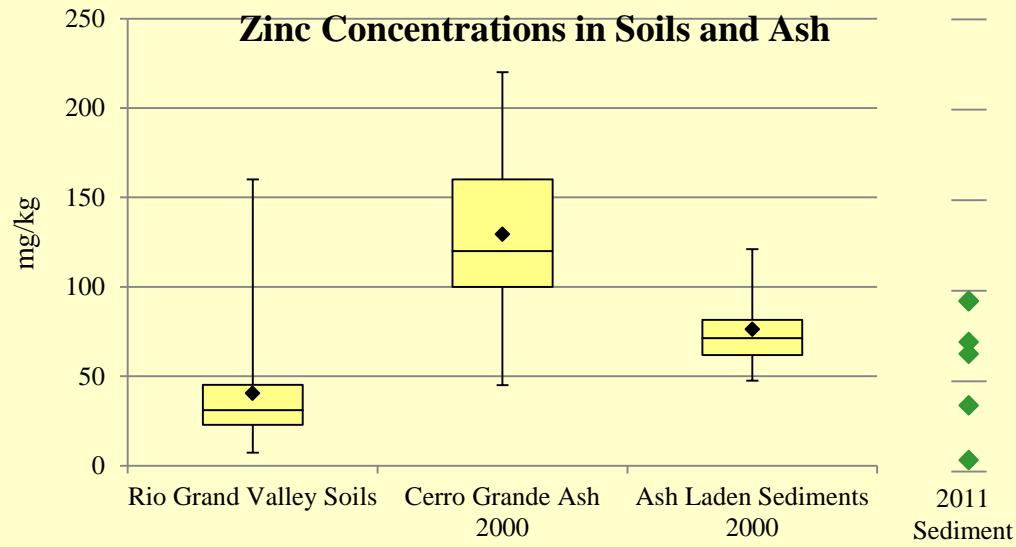
Barium Concentration in Background, Wildfire Ash, and Ash in Stormwater Transport



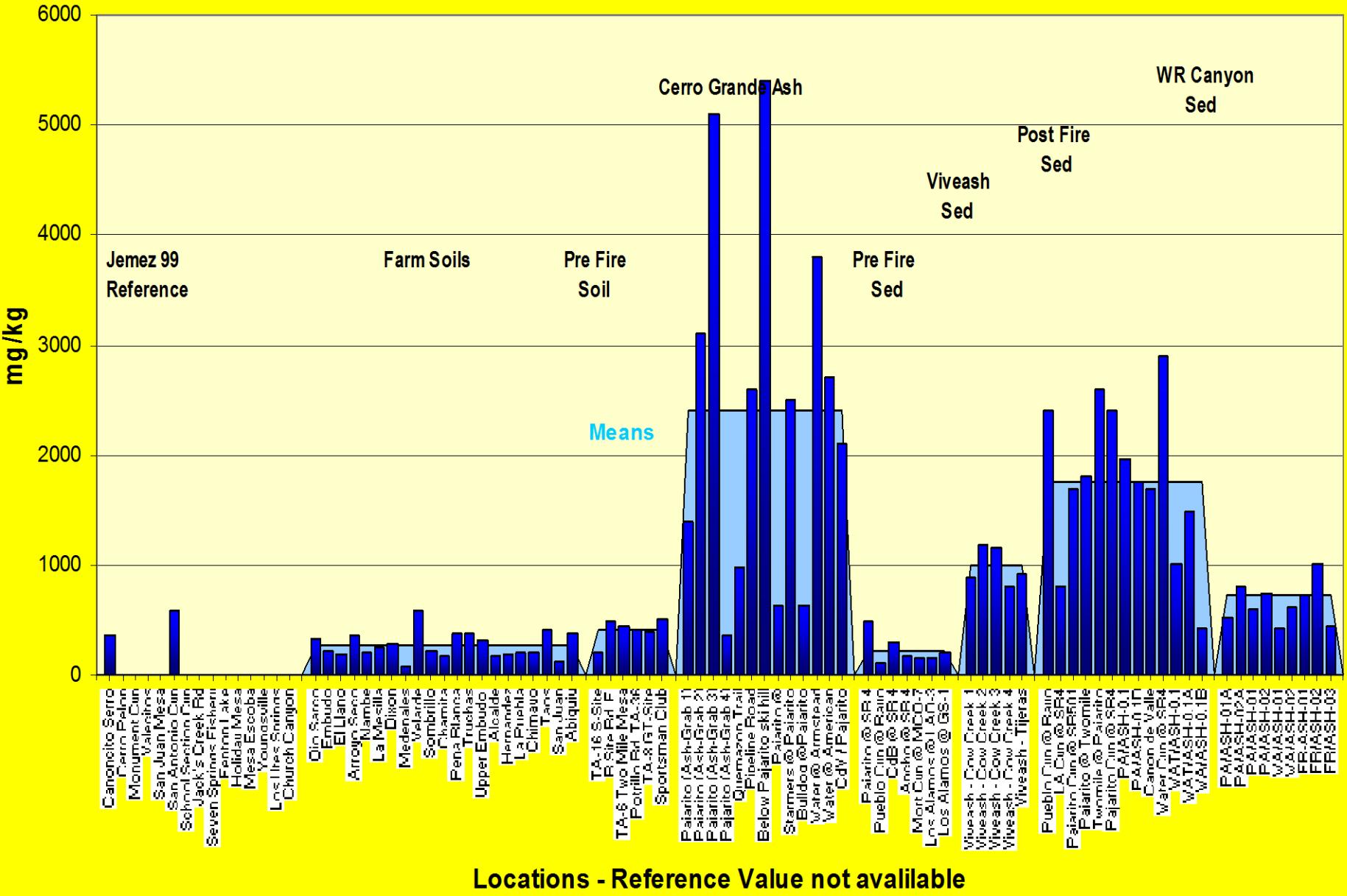
Potassium Concentration in Background, Wildfire Ash, and Ash in Stormwater Transport



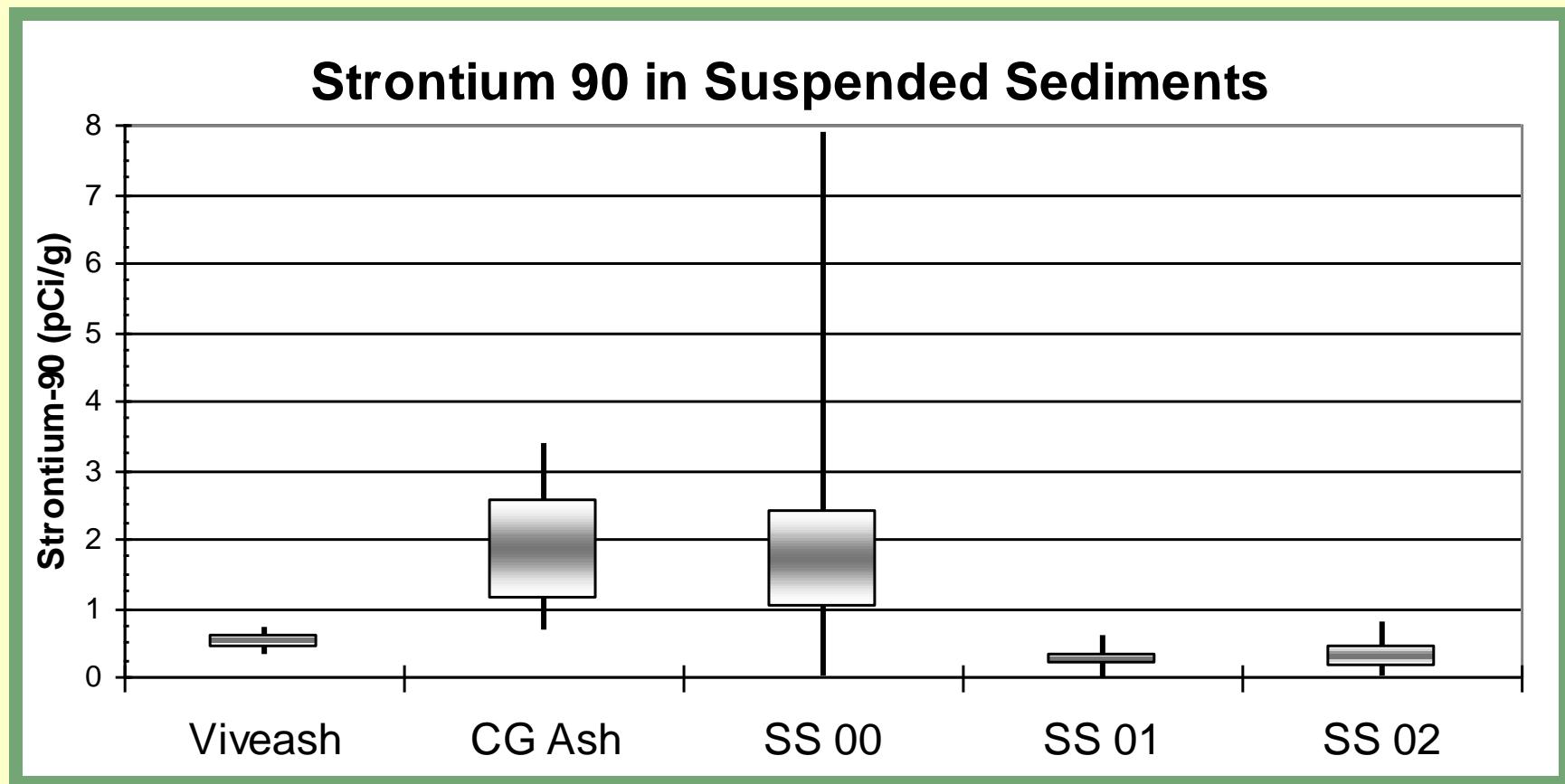
Zinc Concentration in Background, Wildfire Ash, and Ash in Stormwater Transport



Pre and Post Fire Manganese

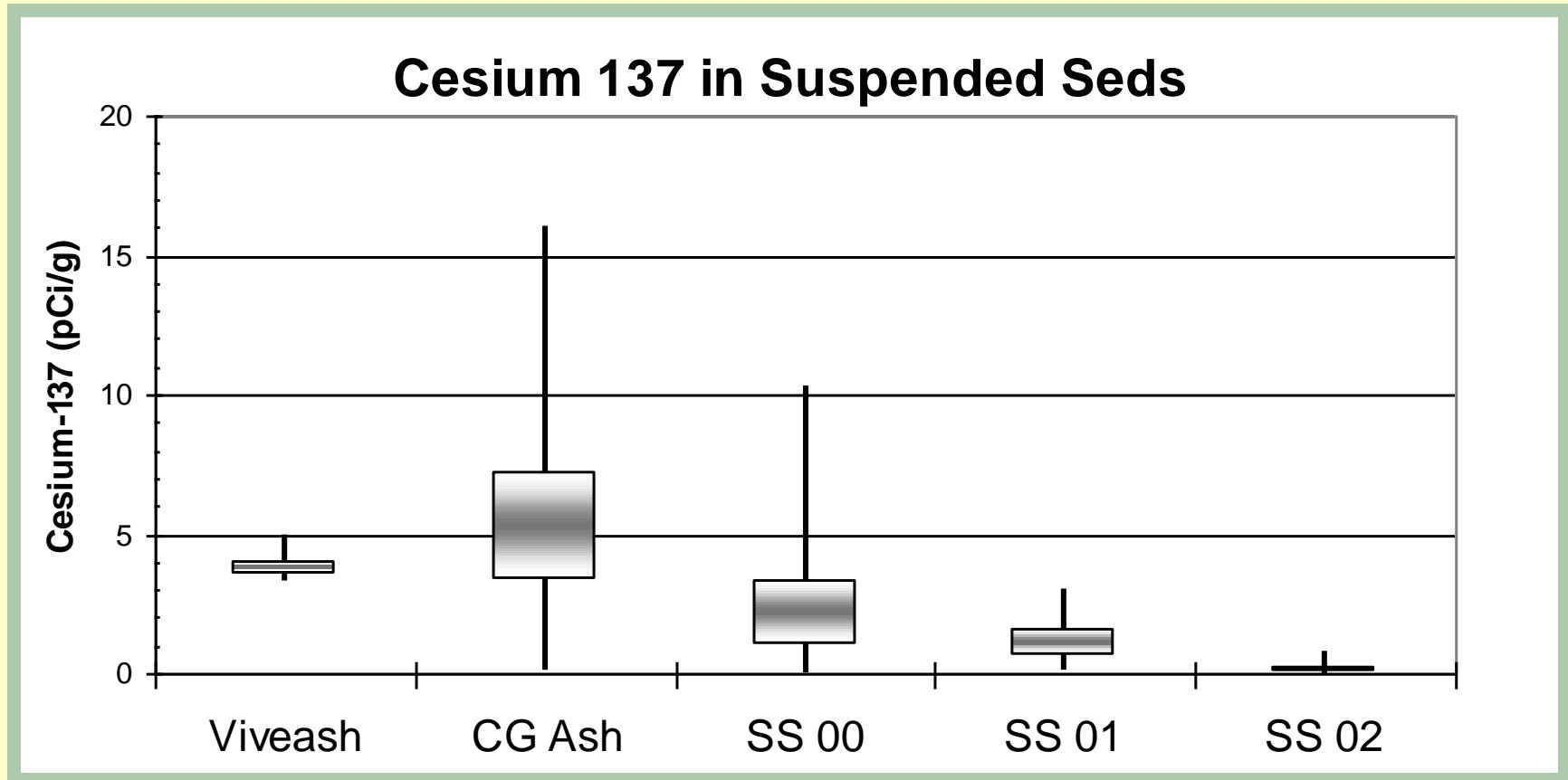


How Long before (Contaminants in) Ash are removed from Watershed?



Strontium-90 measurements in ash collected from the 2000 Viveash and Cerro Grande fires, and in suspended sediments collected from stormwater in 2000 (SS 00), 2001 (SS 01), and 2002 (SS 02)

How Long before (Contaminants in) Ash are removed from Watershed?



Cesium-137 concentrations in ash/and in stormwater suspended sediment samples collected in 2000 (SS 00), 2001 (SS01), and 2002 (SS 02)

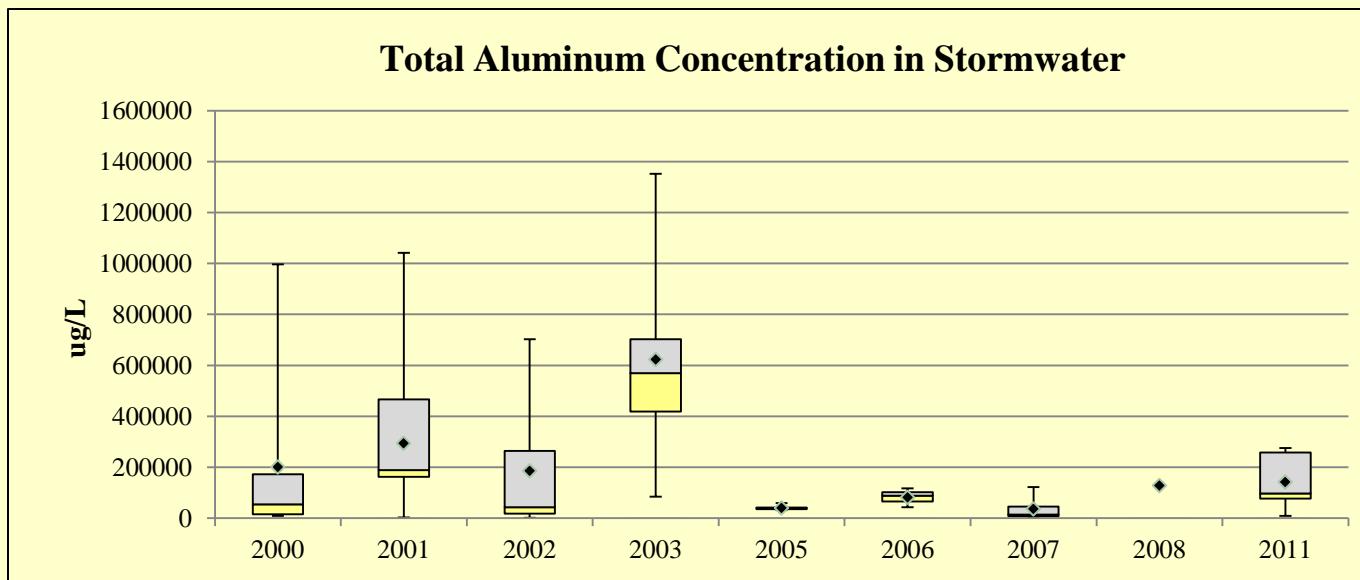
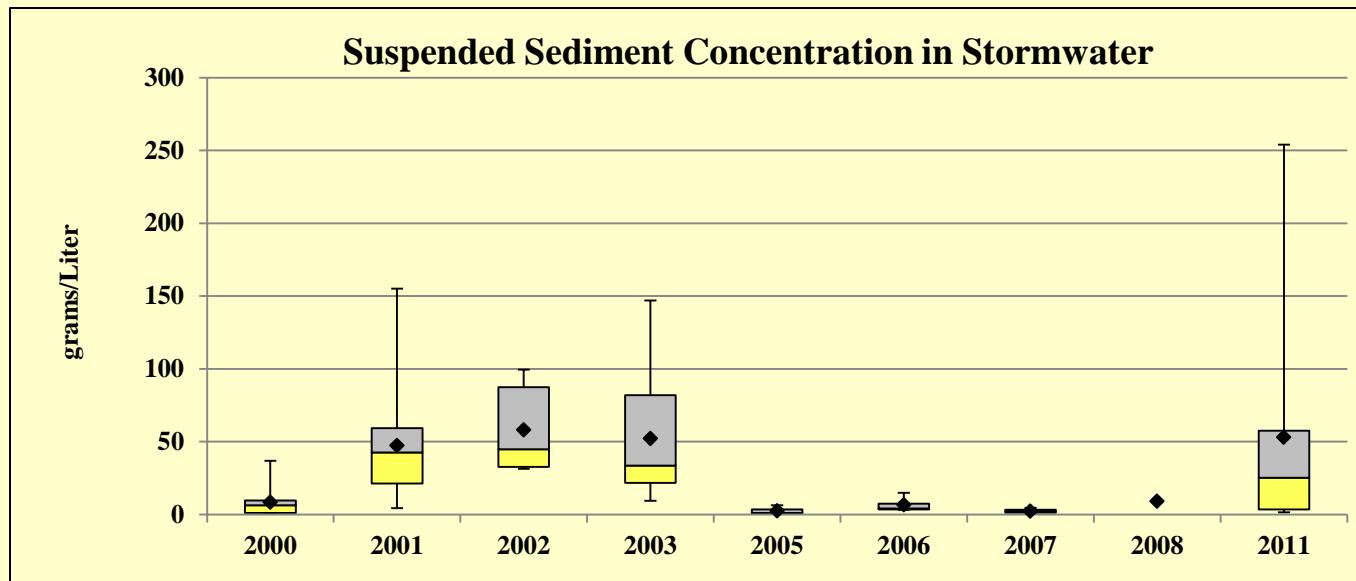
Post-Fire Stormwater Quality

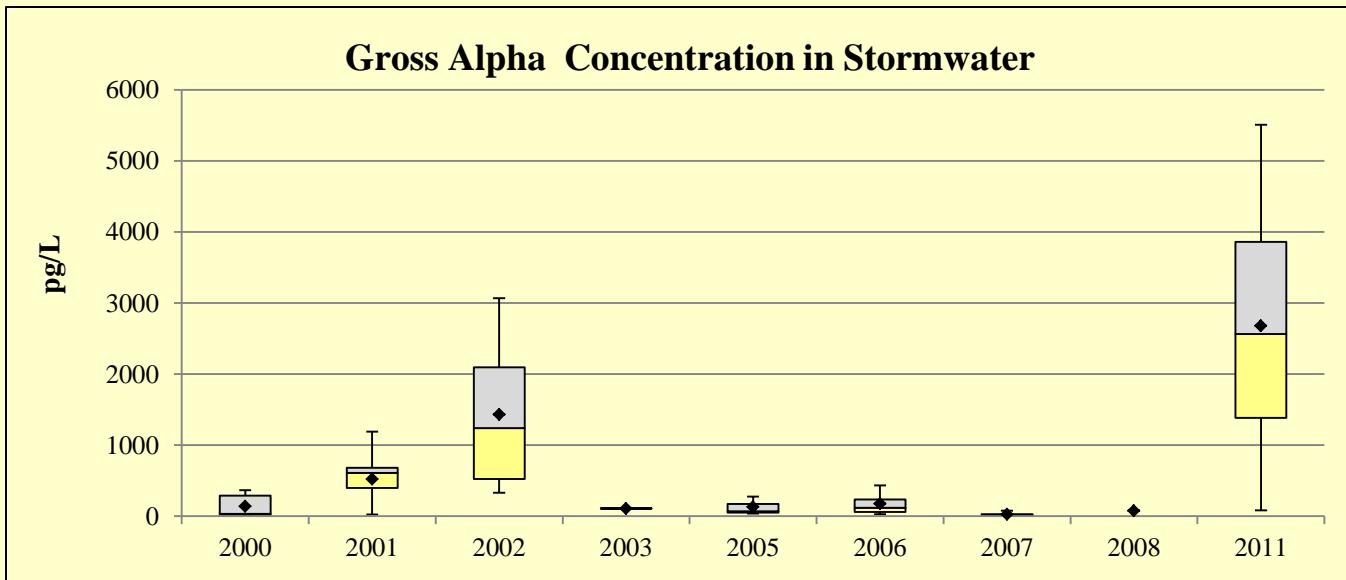
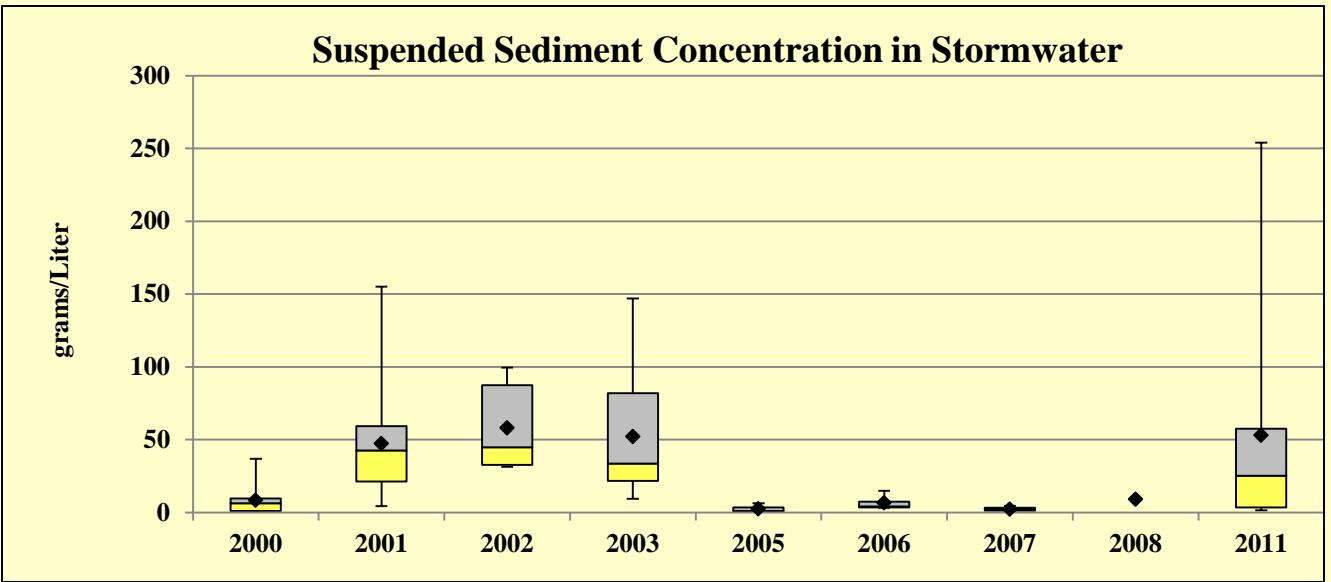
Livestock Watering and
Irrigation Standards

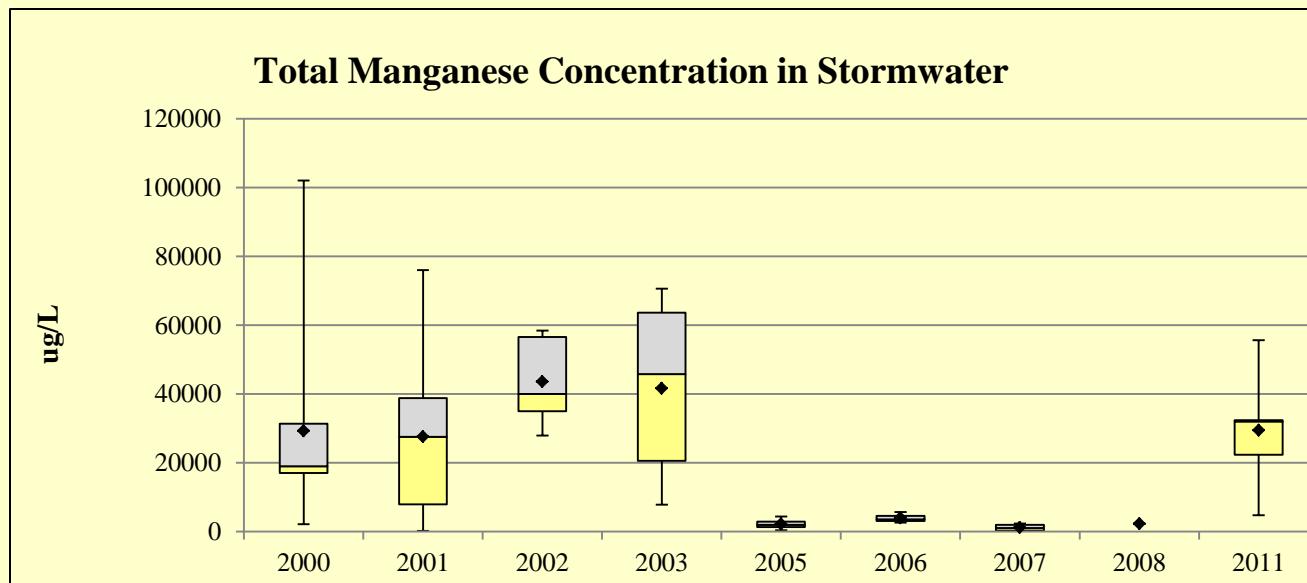
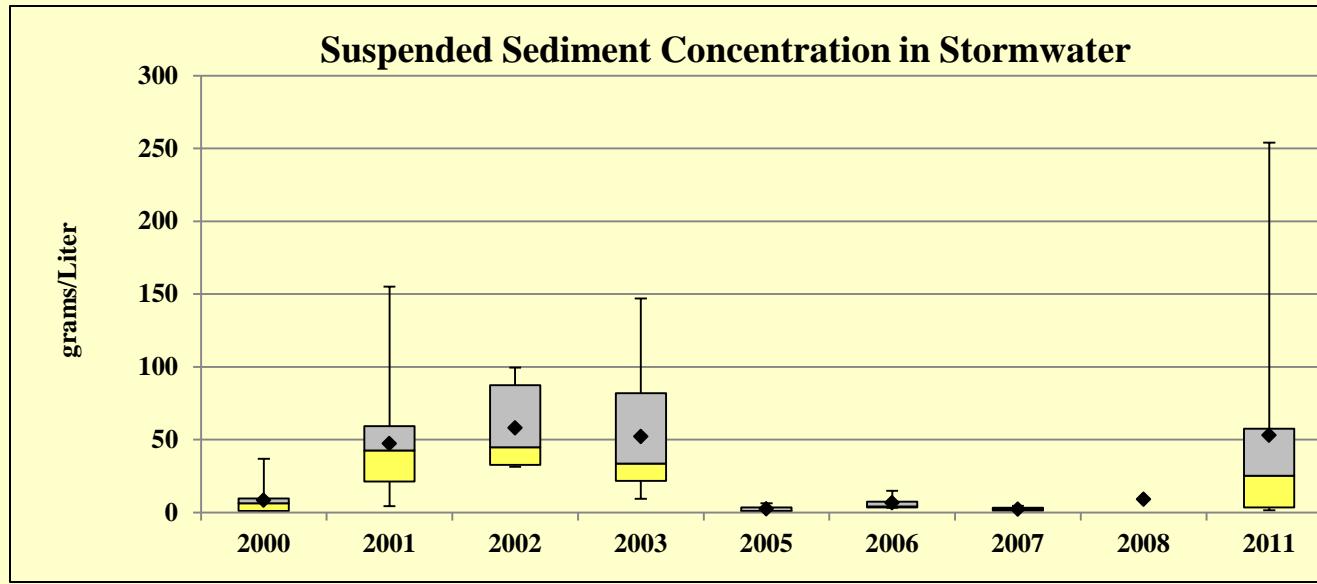
Metals Summary compared to Irrigation and Livestock Watering Standards

	Average	Median	Maximum	Irrigation Standard	Livestock Watering Standard
	ug/L	ug/L	ug/L	ug/L	ug/L
Dissolved Aluminum	8,988	785	171,000	5,000	NA
Dissolved Arsenic	6.6	5	49.9	100	200
Dissolved Boron	59.3	39.6	369	750	5,000
Dissolved Cadmium	0.5	0.1	5	10	50
Dissolved Chromium	5.3	1.4	86	100	1,000
Dissolved Cobalt	7.3	2.8	95	50	1,000
Dissolved Copper	9.0	3.0	122	200	500
Dissolved Lead	3.3	0.7	77.1	5,000	100
Total Mercury	0.2	0.1	1.1	NA	10
Dissolved Molybdenum	3.7	2.8	13	1,000	NA
Dissolved Vanadium	11.3	4.2	169	100	100
Dissolved Zinc	53.7	6.4	958	2,000	25,000
Gross Alpha (Total)	626.2	273	5,510	NA	15 pCi/L
Gross Alpha (Filtered)	2.0	1.64	7.06	NA	NA
Radium 226 & Radium 228 (Total)	54.3	44.8	133.5	NA	30 pCi/L

Out of 109 filtered Radium 226 & 228 only 27 were detections with a maximum of 2.3 pCi/L







Summary

- Our data indicates that in general, concentrations of radionuclides and metals in ash from the burned area and in stream course sediments below the fire are elevated.
- We expect ash radionuclide concentrations to be 1.5 to 15 times greater than background; and Metal concentrations up to 9 times greater, except Be, Co, Cr, Fe, Ni, and Vn.
- We expect dissolved aluminum and unfiltered gross alpha and unfiltered radium-226 & radium-228 will exceed irrigation and livestock standards
- We expect ash (and contaminants in ash) to be flushed from the watersheds within two years
- Previous flood magnitudes and frequencies may never completely recover to pre-fire conditions, but should diminish within 4-6 years as watersheds recover and their capacity to absorb rainfall increases

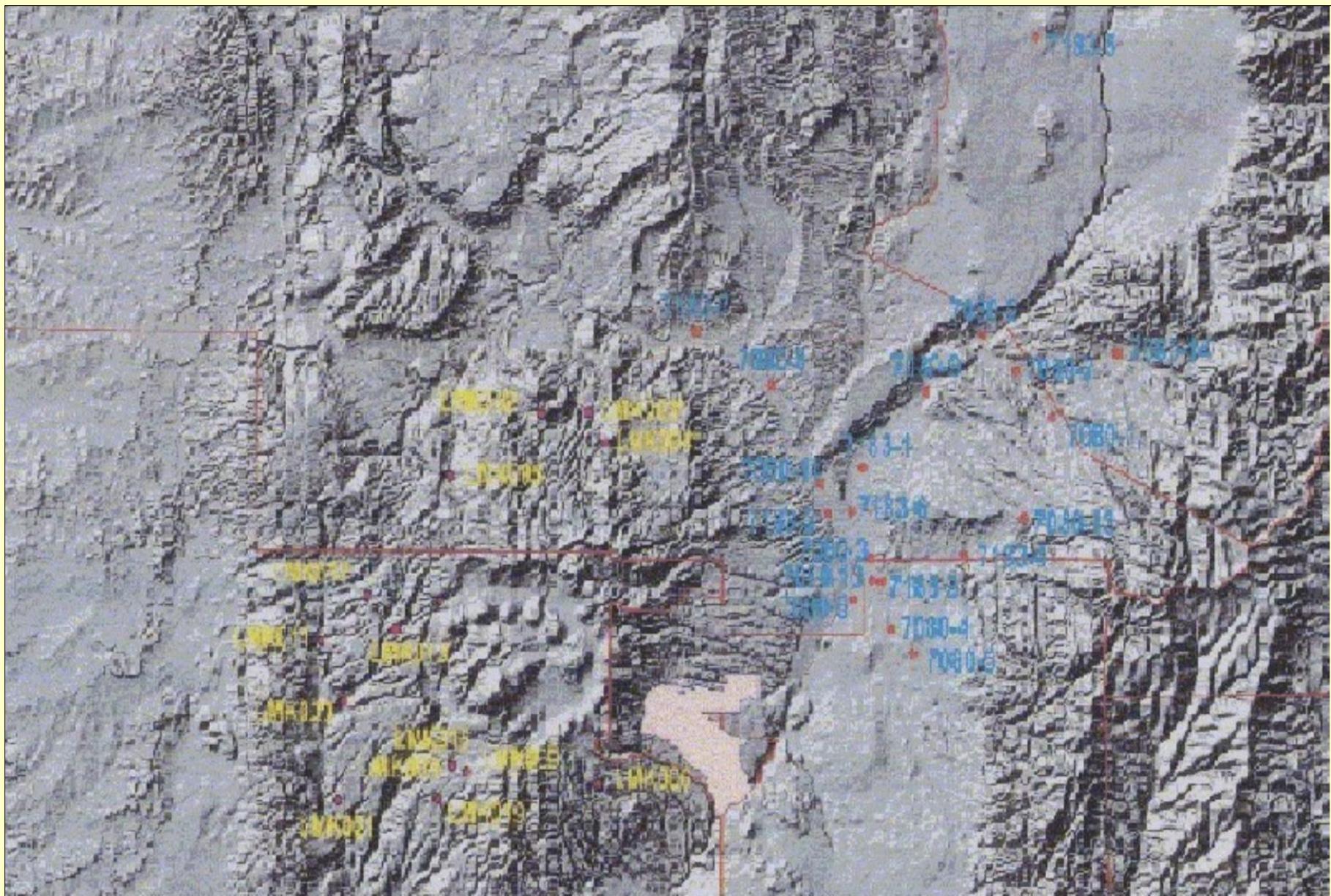
What's Next?

- **The Interagency Flood Risk Assessment Team composed of scientists from the New Mexico Environment Department and Health Department, and the Los Alamos National Laboratory are evaluating potential health risks from exposure to soils sediments and water containing ash**
- **We will continue monitoring flows and water chemistry in stormwater**
- **We propose to collect and analyze farm soils, residual ash, ash laden sediments and irrigation waters**

Data Presentation

- **Charts for 6 radionuclides and 23 metals demonstrate relationships among measurements of:**
 - **Pre-fire soils**
 - **Forest floor ash**
 - **Ash-laden sediments**
- **The following charts: Strontium ⁹⁰, Plutonium^{239/240}, Manganese and Lead are representative of these relationships**

NNM Background and Farm Soil Locations



Stormwater Samples Collected by NMED Since the Las Conchas Fire

Water Samples taken to monitor Las Conchas flooding			Method	MEP	EC	Stress Alpha	Dissolved spec	In/24hr	MEPU	MEQ	Se-00	Regional	Residual/Precip	PCB Concentrations		
Sampling Station	Collection Date	Retrieved Date	Submitted for Analysis												Turnaround time requested	Date results expected back
Bland_9.15.11.17:00	9/15/2011	9/22/2011		x	x	x	x	x	x	x	x					
E050_9.16.11.01:48(W)	9/16/2011	9/21/2011		x	x	x	x	x	x	x	x	x	x	x	30	
E050_9.16.11.02:38(W)	9/16/2011	9/21/2011		x	x	x	x	x	x	x	x	x	x	x	30	
E050_9.16.11.3:28(W)	9/16/2011	9/21/2011		x	x	x	x	x	x	x	x	x	x	x	30	
E050_9.12.11.08:59(W)	9/12/2011	9/14/2011		x	x	x	x	x	x	x	x	x	x	x	30	
E050_9.12.11.09:49(W)	9/12/2011	9/14/2011		x	x	x	x	x	x	x	x	x	x	x	30	
E050_9.12.11.10:39(W)	9/12/2011	9/14/2011		x	x	x	x	x	x	x	x	x	x	x	30	
E050_9.10.11.02:10(W)	9/10/2011	9/12/2011		x	x	x	x	x	x	x	x	x	x	x	30	
E050_9.10.11.03:00(W)	9/10/2011	9/12/2011		x	x	x	x	x	x	x	x	x	x	x	30	
E050_9.10.11.03:50(W)	9/10/2011	9/12/2011		x	x	x	x	x	x	x	x	x	x	x	30	
Rio Grande @ BDD Regional-9.7.11.14:41	9/7/2011	9/12/2011		x	x	x	x	x	x	x	x	x	x	x	30	
Rio Grande @ BDD Regional-9.7.11.15:26	9/7/2011	9/12/2011		x	x	x	x	x	x	x	x	x	x	x	30	
Rio Grande @ BDD Regional-9.7.11.16:11	9/7/2011	9/12/2011		x	x	x	x	x	x	x	x	x	x	x	30	
Rio Grande @ BDD Regional-9.7.11.16:56	9/7/2011	9/12/2011		x	x	x	x	x	x	x	x	x	x	x	30	
E110-9.7.11.14:27	9/7/2011	9/7/2011		x	x	x	x	x	x	x	x	x	x	x	30	
E050_9.6.11.14:10	9/6/2011	9/8/2011		x	x	x	x	x	x	x	x	x	x	x	30	
E050_9.6.11.15:00	9/6/2011	9/8/2011		x	x	x	x	x	x	x	x	x	x	x	30	
E050_9.6.11.15:50	9/6/2011	9/8/2011		x	x	x	x	x	x	x	x	x	x	x	30	
RG at Otowi-9.5.11.01:08(W)	9/5/11	9/6/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/7/2011
RG at Otowi-9.5.11.00:08(W)	9/5/11	9/6/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/7/2011
RG at Otowi-9.4.11.23:48(W)	9/4/11	9/6/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/7/2011
E110_9.1.11.18:33(W)	9/1/11	9/6/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/7/2011
BDD_9.4.11.21:54(W)	9/4/11	9/6/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/7/2011
BDD_9.4.11.21:55(W)	9/4/11	9/6/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/7/2011
BDD_9.4.11.22:44(W)	9/4/11	9/6/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/7/2011
BDD_9.4.11.22:46(W)	9/4/11	9/6/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/7/2011
E050_9.4.11.22:38(W)	9/4/11	9/6/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/7/2011
E050_9.4.11.21:48(W)	9/4/11	9/6/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/7/2011
E050_9.4.11.20:58(W)	9/4/11	9/6/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/7/2011
E050_9.1.11.20:18(W)	9/1/11	9/2/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/7/2011
E050_9.1.11.19:28(W)	9/1/11	9/2/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/7/2011
E050_9.1.11.18:38(W)	9/1/11	9/2/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/7/2011
Rio Grande above Alameda_8.17.11.21:47(W)	8/17/2011	8/18/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/7/2011
Rio Grande at BDD_8.29.11.04:21(W)	8/29/11	8/30/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/1/2011
Rio Grande at BDD_8.29.11.06:36(W)	8/29/11	8/30/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/1/2011
Rio Grande at BDD_8.29.11.05:06(W)	8/29/11	8/30/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/1/2011
Rio Grande at BDD_8.29.11.05:51(W)	8/29/11	8/30/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/1/2011
Rio Grande at BDD_8.26.11.20:14(W)	8/26/11	8/30/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/1/2011
Rio Grande at BDD_8.26.11.21:04(W)	8/26/11	8/30/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/1/2011
E050_8.28.11.04:35(W)	8/28/11	8/29/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/1/2011
E050_8.28.11.03:45(W)	8/28/11	8/29/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/1/2011
E050_8.28.11.02:55(W)	8/28/11	8/29/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/1/2011
Rio Grande at Otowi_8.26.11.21:00(W)	8/26/11	8/29/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/1/2011
Rio Grande at Otowi_8.26.11.19:40(W)	8/26/11	8/29/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/1/2011
Rio Grande at Otowi_8.26.11.20:20(W)	8/26/11	8/29/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/1/2011
E110_8.28.11.20:41(W)	8/28/11	8/29/2011		x	x	x	x	x	x	x	x	x	x	x	30	10/1/2011
Rio Grande _8.21.11.18:42(W)	8/21/11	8/22/2011		x	x	x	x	x	x	x	x	x	x	x	30	9/25/2011
Rio Grande @ Buckman_8.21.11.19:27(W)	8/21/11	8/22/2011		x	x	x	x	x	x	x	x	x	x	x	30	9/25/2011
Rio Grande @ Buckman_8.21.11.19:29(W)	8/21/11	8/22/2011		x	x	x	x	x	x	x	x	x	x	x	30	9/25/2011
Rio Grande @ Buckman_8.21.11.20:19(W)	8/21/11	8/22/2011		x	x	x	x	x	x	x	x	x	x	x	30	9/25/2011
Rio Grande @ Otowi_8.21.11.18:11(W)	8/21/11	8/22/2011		x	x	x	x	x	x	x	x	x	x	x	30	9/25/2011
Rio Grande @ Otowi_8.21.11.18:51(W)	8/21/11	8/22/2011		x	x	x	x	x	x	x	x	x	x	x	30	9/25/2011
Rio Grande @ Otowi_8.21.11.19:31(W)	8/21/11	8/22/2011		x	x	x	x	x	x	x	x	x	x	x	30	9/25/2011
Rio Grande above Alameda_8.21.11.04:53(W)	8/21/11	8/22/2011		x	x	x	x	x	x	x	x	x	x	x	30	9/25/2011
Rio Grande above Alameda_8.13.11.04:53(W)	8/13/2011	8/16/2011		x	x	x	x	x	x	x	x	x	x	x	30	9/25/2011
E050_8.19.11.18:49(W)	8/19/11	8/20/2011		x	x	x	x	x	x	x	x	x	x	x	30	9/25/2011
E050_8.19.11.19:39(W)	8/19/11	8/20/2011		x	x	x	x	x	x	x	x	x	x	x	30	9/25/2011
E050_8.19.11.20:29(W)	8/19/11	8/20/2011		x	x	x	x	x	x	x	x	x	x	x	30	9/25/2011
E050_8.22.11.16:08(W)	8/22/11	8/24/2011		x	x	x	x	x	x	x	x	x	x	x	30	9/25/2011
E050_8.22.11.16:57(W)	8/22/11	8/24/2011		x	x	x	x	x	x	x	x	x	x	x	30	9/25/2011
E050_8.22.11.17:47(W)	8/22/11	8/24/2011		x	x	x	x	x	x	x	x	x	x	x	30	9/25/2011
E110_8.22.11.16:30(W)	8/22/11	8/24/2011		x	x	x	x	x	x	x	x	x	x	x	30	9/25/2011
E110_8.22.11.17:20(W)	8/22/11	8/24/2011		x	x	x	x	x	x	x	x	x	x	x	30	9/25/2011
Peralta_8.24.11.17:15(W)	8/24/2011	8/25/2011		x	x	x	x	x	x	x	x	x	x	x	30	9/25/2011
E110_7.22.11.22	7/22/11	7/27/2011		x	x	x	x	x	x	x	x	x	x	x	15	8/12/2011
Rio Grande @ Buckman_7-28-11.19:06	7/28/11	7/28/2011		x	x	x	x	x	x	x	x	x	x	x	30	9/1/2011
Rio Grande @ Buckman_7-28-11.19:56	7/28/11	7/28/2011		x	x	x	x	x	x	x	x	x	x	x	30	9/1/2011
BDD-8-3-11.18:09 (water)	8/3/11	8/4/2011		x	x	x	x	x	x	x	x	x	x	x	30	9/10/2011
BDD-8-3-11.18:59 (Water)	8/3/11	8/4/2011		x	x	x	x	x	x	x	x	x	x	x	30	9/13/2011
BDD-8-3-11.17:54 (Water)	8/5/11	8/4/2011		x	x	x	x	x	x	x	x	x	x	x	30	9/16/2011
BDD-8-3-11.18:44 (Water)	8/5/11	8/4/2011		x	x	x	x	x	x	x	x	x	x	x	30	9/19/2011
E110-8-5-11.14:47 (Water)	8/5/11	8/4/2011		x	x	x	x	x	x	x	x	x	x	x	30	9/22/2011